International Journal of Management Research and Emerging Sciences
Vol 15, No 1, March 2025, PP. 135-155

Navigating the Digital Transformation: The Impact of E-Banking Channels on Bank Performance in Pakistan's Evolving Financial Landscape

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ARTICLE INFO

Article History:
Received: 31 Dec 2024
Revised: 18 Feb 2025
Accepted: 11 Mar 2025
Available Online: 24 Mar 2025

DOI:
https://doi.org/10.56536/ijmres.v15i1.756

Keywords:
e-banking, ATM, Point of Sale, Mobile Banking, Internet Banking, e-Commerce, Profitability

JEL Classification:
G17, G21, G32

ABSTRACT

E-banking is a game changer that revolutionized the financial landscape by breaking the barriers of 9 to 5 traditional physical banking and enabling continuous financial transactions without time boundaries. COVID-19 signifies its importance by increasing the adoption of digital banking channels. This study examines the dynamic relationship between various e-banking channels in Pakistan and bank performance from 2006 to 2022 while controlling macroeconomic variables like GDP and inflation. ARDL analysis confirmed that the previous year's banking performance dominantly affects the current year's banking performance. It confirms that historical developments in the banking sector, like regulatory changes, modifications in e-banking channels, and technological advancements, lead to current and future banking performance by bringing sustainability to dynamic environmental conditions. Customer perception toward e-banking channels also shapes its relationship with bank performance. ATMs are perceived as secure, easy, and can be used 24/7 across the country, which is why the desired positive relationship is confirmed with the bank's performance. However, due to high operational and maintenance costs, security risks, and lack of customer adoption, the desired positive impact of mobile banking and e-commerce has not been fully realized. The study's novelty lies in its comprehensive consideration of all the e-banking channels operational in Pakistan and their impact on performance after controlling macroeconomic factors. This study highlights that the banking sector needs to educate its customers to improve their financial literature, reduce maintenance and operational costs, improve customer satisfaction, and increase financial inclusion in Pakistani society.

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INTRODUCTION

E-banking is a paradigm shift due to rapid growth in IT, stimulating radical changes in every field, most evidently in the business domain, specifically in the banking sector across the globe. It renovated the traditional banking system into a self-service, customized 24/7 banking system with the help of electronic gadgets (Chaimaa et al., 2021; Kim et al., 2024). E-banking is a joint product of globalization and IT development in the domain of banking services observed in the form of digitization of a vast canvas of financial activities covering suppliers, producers, distributors, wholesalers, retailers and individual customers across the globe, especially in emerging markets like Bangladesh, Pakistan etc (Alnemer, 2022; Arslan et al., 2024; Gazi et al., 2025; Khan et al., 2024; Okolie & Eze, 2023).

Prior literature like Sullivan (2000), DeYoung (2001) and Yang et al. (2018) confirmed that e-banking has increased the profitability of banks through cost efficiency. In comparison, mixed results observed in emerging economies like Gupta et al. (2020) in Nepal confirmed a positive relationship. This is due to an increased customer base, decreased operational expenses, and increased operational flexibility, which can be achieved by extending diversified income generation avenues to increase revenue (Naeem et al., 2023). In contrast, Siam (2006) in Jordan and Gutu (2014) in Romania confirmed negative impacts. The reason behind the negative relationship in emerging economies is because of high initial infrastructure expenditures, demographic differences, policies, online riskiness, and customer preferences for traditional banking channels leading to contrasting outcomes (Kamboh & Leghari, 2016; Saroy et al., 2023; Singh, 2023).

Besides that, a crucial issue observed in Pakistan's economy is that factors like high infrastructure cost, new technology acceptability, cyber security issues, and lack of customer fintech literacy hinder e-banking adoption. This leads to a lack of customer trust in digital channels (Ramos-Meza et al., 2021; Vaid, 2024). It requires the dire need to check the outcome various e-banking channel contributing toward banking sector profitability.

Commercial banks must follow the continuous improvement principle for e-banking services to meet the dynamic customer requirements in the contemporary era. This will improve overall banks' profitability by increasing the adoption rate of e-banking services due to customizing quality, secure and efficient e-banking offerings in comparison to other banks (Chanda et al., 2024; Gazi et al., 2025; Khan et al., 2024; Kim et al., 2024; Minhaj & Khan, 2025). Furthermore, Vaid (2024) confirmed that service quality and service reliability should be the prime focus of e-banking services, which increase customer adoption and satisfaction, leading to improved performance. Muditomo et al. (2024) mentioned that innovation in digital banking offerings should be balanced with risk management aspects as well only then customers will incline more toward e-banking.

A prominent research gap exists in the literature specifically for emerging economies, and it is more pertinent to Pakistan to explore which e-banking channels are more customer friendly and provide more quality services with operational excellence and high security with no or low downtime, which can be judged from their usage point of view. Moreover, an industry-wise banking sector performance analysis is also overlooked in both developed and emerging economies, considering all e-banking channels. This study will fill this gap and find the answer to this question.

Furthermore, Naeem et al. (2023) highlighted that in a developing economy like Pakistan, factors like limited resources, weak technological infrastructure and scarce trained professionals restrict the acceptance of e-banking in Pakistan. The State Bank of Pakistan (SBP), June 2022, reports an enormous increase in the use of e-banking in Pakistan, especially after COVID-19 and the huge infrastructure development expenditure exercised by the government of Pakistan. Now, it is time to judge how these e-banking services/channels affect the performance of the entire banking sector of Pakistan.

This study has several contributions to the existing body of knowledge. First, this study examines the impact of various e-banking channels on banking sector performance. It confirms that the channels considered useful, secure, and efficient by the customers are utilized more by them, which increases bank performance compared to others. Second, this study highlights the e-banking channels requiring more attention to further boost the bank's performance. Third, this study allows policymakers to design e-banking channels to improve convenience, ultimately increasing the banking sector's profitability.

LITERATURE REVIEW

Davis (1989) introduced the concept of technology acceptance, which explained that customer use of technology is based on their perception related to technology usefulness and ease of use. In the case of the e-banking domain, this concept is quite valid as well. In the case of Pakistan and other developing economies, the concept of e-banking is evolving, and its growth, leading to improved banking performance, is explained by the technology acceptance model.

Prior literature confirmed that several terms like e-banking, internet banking, digital banking, and cashless banking are alternatively used to examine their impact on the profitability or performance of respective banks operated in both developed and emerging economies (Chukwu & Molokwu, 2022; Kamboh & Leghari, 2016; Mamedov & Azer, 2020; Ramos-Meza et al., 2021). However, the canvas of e-banking is quite large, covering all other exciting terminologies. This study is going to consider all e-banking channels currently available in Pakistan. Now, accepting digital innovations and advancement in the banking industry increases the customer base and improves banks in today's competitive environment (Mahmood et al., 2023; Nazaritehrani & Mashali, 2020; Ritu & Pandey, 2023; Singh, 2023).

Sullivan (2000) explained that e-banking generates revenues and reduces costs, predominantly the overhead expenses, which leads to an increase in the overall performance proxied by profitability. The results align with DeYoung (2001) and Simpson (2002). Holden and El-Bannany (2004) pointed out that UK banks experienced increased profitability after expanding their ATM network. Kagan et al. (2005) highlighted that e-banking transformed overall banking operations by providing banking services in customers' pockets, increasing banks' earning capacity. DeYoung et al. (2007) confirmed that in the US, e-banking increases profitability by generating extra income through expanding services. Onay et al. (2008) studied Turkish banks, confirming that investing in e-banking is fruitful for their performance and profitability. Ciciretti et al. (2009) examined Italian Commercial banks and concluded that e-banking increases the banks' profitability and reduces the associated bank risk.

Similarly, Kondo (2010) confirmed that ATM expansion has no relationship with bank profitability in Japan. Yang et al. (2018) studied Chinese banks and showed a positive effect flow from e-banking to profitability and performance. Ky et al. (2019) examined sub-Saharan African banks and confirmed that financial innovation in the form of mobile money significantly increases bank performance and efficiency. Kumar et al. (2022) studied Japanese banks and confirmed financial inclusion is important even in developed economies. However, ATMs have no relationship with bank profitability. Cost, risk

management, and bank size significantly impact profitability. These results are in line with Kondo (2010).

Furthermore, studies in emerging economies of South Asia like India, Pakistan and Nepal confirmed that a positive impact flows from various e-banking channels like ATMs, smart cards, and e-commerce to profitability (Gautam & Sah, 2023; Gautam, 2012; Kazmi & Hashim, 2015). However, Gupta et al. (2020) discussed that reducing transaction costs and enhancing deposits through e-banking improved the profitability of Indian banks. Motwani and Vora (2021) explained that due to bad mobile networks, huge investments to increase ATM, POS and mobile banking activities further reduce the profitability of Indian banks. Malhotra and Singh (2009) confirmed no relationship between e-banking and performance.

In studies like Monyoncho (2015), Ogutu (2018) and Vekya (2017), results are in line with existing literature after studying Kenyan banks. In contrast, examining Jordanian banks confirms a negative (positive) relationship between e-banking and performance in the short run (long run) (Siam, 2006). Shahabi and Faezy Razi (2019) established that e-banking negatively affects bank profitability in different countries, especially Jordan, Asian economies and Romania. The basic reason for the established relationship is resistance to accepting the new normal in e-banking compared to traditional banking practices. Ritu and Pandey (2023) found a positive relationship between various e-banking channels and Nepal banks.

Kim et al. (2024) examined the e-banking services in Cambodia. They confirmed that banks need to update their e-banking services 24*7 in the contemporary era because of the increased adoption of e-banking in current day-to-day life. The study gathered data from 700 customers, and through path analysis, results extracted that convenience provided in the transactions and access improves customer satisfaction, ultimately leading to a boost in bank performance by providing a competitive edge while performance-related risks reduce it. Vaid (2024) highlighted the role of digitalization in transforming traditional banking operations that boosts overall banking performance. After the global financial crisis in 2008, regulatory governance became more stringent, integrating the digital variants of banking facilities revolutionize the overall financial industry by providing banking operations 24*7 worldwide. However, without focusing on service quality and service reliability, the desired results from various types of e-banking channels cannot be extracted. However, Muditomo et al. (2024) find that innovation in banks' payment systems needs to be safe from different types of security and operational risks; otherwise, the results are not in favor of desired bank performance. This was confirmed by using Indonesian bank country-level data from 2013 to 2020. It is recommended that banks should introduce innovative product, but their associated risks should also manage to remain competitive. Chanda et al. (2024) tried to examine the factors that are either triggering or hindering the adoption of e-banking during COVID-19 and how it affects bank performance. Results are very much the same as Vaid (2024), Mintah et al. (2024) and Kim et al. (2024).

Furthermore, the study recommended that banks should device such mechanisms of e-banking services that increase customer engagement and designed as per their attitudes, leading to increased performance. In a most recent study, Minhaj and Khan (2025) confirmed that bank performance is significantly improved by e-banking. The basic reason is that in India, reliable and quality e-banking services directly improve the satisfaction of Indian customers, which improves their loyalty and retention for the bank and directly leads to overall performance by giving a competitive edge to specific banks over others.

Along with that, studies focusing on Pakistan show mixed results. Sumra et al. (2011) confirmed that e-banking positively and significantly impacts their performance. It is further elaborated that positive impact is only realized by improving IT infrastructure. It must reduce overall cost and increase customer ease, regulating the perception to accept the new technology—similar results reported by Rauf et al. (2014). Kamboh and Leghari (2016) examined the impact of certain cashless banking options on performance and obtained mixed results. ATMs have a negative impact, while POS and mobile banking positively impact profitability. It highlights that policymakers must prioritize their infrastructure development toward POS and mobile banking options by reappropriating from the ATM side (Kamboh & Leghari, 2016). Similar results were reported by Nwakoby et al. (2020). In another study, Rauf et al. (2018) proved that focusing on e-banking operations and their adoption provides a competitive advantage to Pakistani banks. Similar results were reported by Saroy et al. (2023). Khalil (2020) rejected this stance by saying that issues related to cybersecurity need to be addressed, which require persistent high input costs leading to reduced profitability despite improving the bank's operations. Khan et al. (2024) focused on the commercial banks operating in the South Punjab area of Pakistan and collect the date from 350 customers to check how their satisfaction from e-banking services provided by the affect the performance of the banks. Results confirmed that with increasing the quality, security and reliability of the e-banking channels/services increase customer satisfaction which further boost their loyalty for the banks. This not only improves firm performance but also gives a competitive edge to the banks over others.

RESEARCH METHODOLOGY

Quarterly secondary data of all e-banking channels is collected between 2006 and 2022 from the Payment Review System Department of the State Bank of Pakistan. Whereas the to calculate the quarterly ROA values are collected from the Statistics & Data Warehouse Department of the State Bank of Pakistan. The data is industry-level data. However, data on economic controlled variables are collected from the World Bank database.

Table 1: Variables Measurement (Value in Billion) Volume in Million

Category	Variable	Measures
Dependent Variables	ROA	NI/TA
Independent Variables	ATM	log (ATM-T)
	EC	log (EC- T)
	POS	log (POS-T)
	IB	log (IB-T)
	MB	log (MB-T)
	RTOB	log (RTOB-T)
	IVR	log (IVR-T)
Controlling Variables	Eco_g	Growth rate
	Inflation (INF)	Consumer Price Index

$$ROA_t = \alpha + \beta_1 log RTOB\text{-}T_t + \beta_2 log ATM\text{-}T_t + \beta_3 log POS\text{-}T_t + \beta_4 log IB\text{-}T_t + \beta_5 log MB\text{-}T_t + \beta_6 log IVR\text{-}T_t + \beta_6 log EC\text{-}T_t + \lambda_1 log Eco_g_t + \lambda_2 log INF_t + \mu_t \quad (1)$$

Equation 1 is used to check the impact of e-banking channels on the profitability of the banking sector of Pakistan. It is quite common in financial variables that are stationary at different levels. In that case, Autoregressive Distributed Lag (ARDL) is the best possible option because it has the inbuilt capability to handle the combination of stationary (I(0)) and non-stationary (I(1)) variables, which is not possible in other models like VAR, standard regression etc. (Chalkiadakis et al., 2023). A similar approach was employed in the following studies conducted by Motwani and Vora (2021) and Ritu and Pandey (2023).

RESULT AND DISCUSSION

Table 2 presents a descriptive statistical analysis of nearly seventeen years of ROA and all e-banking channels. The data is logically and efficiently summarized, following the statistical analysis of previous studies (Eze & Egoro, 2016; Kamboh & Leghari, 2016; Ritu & Pandey, 2023). Logarithmic transformation is performed on e-banking channels to normalize the data and make them comparable.

Table-2: Descriptive Statistics

	Mean	Median	Std. Dev.
ROA	0.010486203	0.009527067	0.002898968
ATM	841.3461912	654.9355	717.5459977
EC	3.754411765	0	7.133763191
IB	388.6254559	167.0045	660.086585
IVR	2.169647059	2.1	0.748831423
MB	297.4589234	16.2315	749.5667165
POS	50.97675	30.7345	45.40735127
RTOB	8352.886074	7235.5495	6137.726254

Table 3 shows the correlation analysis results, confirming a moderate positive correlation between ROA POS and RTOB. It explains that system facilitation of quick and efficient transactions increases customer satisfaction and bank performance. Similarly, the increasing use of MB is negatively associated with bank performance due to the increasing cost of maintaining the mobile phone banking platform. EC has negative associations because of security concerns, low-quality service delivery, and high transaction costs, which reduce banks' profitability. Moreover, as the economy grows (Eco_g) due to increased business activities and customer spending, it has a significant positive association with performance. Overall, an increase in cost due to INF reduces the banking performance because of reduced profitability.

Moreover, as customers use ATM cards, they use the same cards for POS, a possible reason for positive association. Similarly, customers tend to adopt new digital means of e-banking as they prefer to use these services in combination, like RTOB with POS, IVR (Interactive Voice Recognition) with IBV and ATM, and IB with EC.

Table 4 shows the results of the unit root test. The result confirmed that few variables are stationary at a level while few variables are stationary 1st difference. Under these conditions, the most appropriate method to use is the ARDL method to handle mixed order of integration, even with small samples, to study short and long-term dynamic relationships between the variables (Nkoro & Uko, 2016; Ulussever et al., 2023).

Table 3: Correlation Analysis

	ROA	POS	MB	IVR	IB	EC	ATM	RTOB	Eco_g	INF
ROA	1									
POS	0.28**	1								
MB	-0.27***	-0.09	1							
IVR	-0.05	0.11	0.07*	1						
IB	-0.03	0.19**	0.14*	0.24*	1					
EC	-0.24	0.11	-0.03	-0.10	0.22**	1				
ATM	-0.05**	0.37**	0.10	0.50***	0.09	-0.06	1			
RTOB	0.30**	0.30**	-0.03*	-0.41	0.11	-0.03	-0.42	1		
Eco_g	0.29**	0.36**	-0.14	-0.04	-0.11	0.12	0.05	0.15*	1	
INF	-0.40**	-0.03	0.09	0.02	0.20*	-0.03	0.12	0.01	-0.34	1

Significance level: *** for 1%, ** for 5%, * for 10%

Table-4: Unit Root Test

Variables	At - Level	At 1st Difference
ROA	-3.378906**	
ATM	-10.14220***	
EC	-1.068786	-6.296353**
IB	-9.765577***	
IVR	-7.647115***	
MB	-7.703800***	
POS	-8.657750***	
RTOB	-40.50427***	
Eco_g	-2.035371	-6.572070***
INF	-0.229036	-10.33785***

Table 5 shows the ARDL model results, which show a dynamic relationship between banking sector performance and e-banking channels. Results confirmed that the banking sector performance of the current quarter is significantly affected by the past quarter's performance. It confirmed that persistence matters in Pakistan's banking sector; however, its effect varies over time.

Moreover, a negative significant relationship was established between the EC and the performance of the banking sector. The possible reason behind this negative relationship is due to the newness of the feature introduced in the e-banking domain in Pakistan. This feature requires a high input cost of infrastructure development and maintenance compared to the low output generated from EC activities (Feizollahi et al., 2014; Šaković Jovanović et al., 2020). Moreover, the governance mechanism is also weak, due to potential losses due to fraud and other unlawful activities curtail customer adoption of this service (Okoye et al., 2021; Wirdiyanti et al., 2023).

A significant but negative relationship effect was also established between MB and ROA (Kumar et al., 2020). It is because the banking sector is spending enormous funds on developing and maintaining mobile banking platforms with a keen focus on security parameters and technological synchronization (Khalifaturofi'ah, 2023). While working to provide ease of use to customers, the majority of the customers in Pakistan are still reluctant to use this feature, so the desired positive impact on the banking sector performance is not retrieved (Del Gaudio et al., 2021; Qatawneh & Makhlouf, 2023; Tam & Oliveira, 2017).

Moreover, a positive significant relationship was established between ATMs and the performance of the banking sector. As a basic requirement, customers demand an ATM for their bank accounts to revolutionize the overall banking system (Awan & Parveen, 2023; Vaid, 2024). Most people who are unfamiliar with banking services generally use ATM services because different governmental support funds are provided through ATM cards. It provides ease to customers as they are no longer bound by traditional banking hours (Muditomo et al., 2024; Sharma, 2023).

Furthermore, RTOB has a negative significant impact on bank performance. Despite the feature that due to RTOB, customers can perform all types of banking transactions 24/7 as per their convenience, unfamiliarity with the new features, riskiness involved in the transactions and service down (Arif et

al., 2020; Rahi et al., 2021; Younas & Kalimuthu, 2021). Along with continuous upgrades, the cost of technological synchronization and risk management outweigh the returns generated from RTOB predominantly due to customer reluctance to consider this option for future use (Heo et al., 2021; Rahi & Abd Ghani, 2021)

The results confirmed that IB has a positive but insignificant impact on ROA. As explained by Liu et al. (2024), several parallel reasons behind this outcome, like the high cost of infrastructure development and operations, low customer adoption rate due to security risk and high fraud exposure, offset the immediate performance results. In comparison, IVR has a negative but insignificant impact on ROA. However, it highlights the gray area which needs improvement. Shah et al. (2019) claimed that normally, banks are trying to be proactive by informing customers about possible online theft and ways to protect themselves through messages, emails and calls. Cybercriminals also use the same method to rob customers (Saeed et al., 2023). This creates confusion in the customers' minds, and the positive impact of IB and IVR takes time to materialize.

A negative, insignificant relationship was also established between POS and the banking sector's performance. The basic reason behind the negative impact is the costs and tax charged while using POS. Several small and medium enterprises also charge Bank charges related to POS, which makes customers reluctant to use this mode of e-banking (Srivastava & Vishnani, 2021). Even the risk factor plays a significant role in customer reluctance to use this factor and the non-availability of the feature in small cities (Kamboj et al., 2022; Picoto & Pinto, 2021). However, the impact is nullified with the growing use of POS facilities in urban areas of Pakistan (Jahan & Shahria, 2022).

Moreover, maintaining the features up to the mark requires several changes and upgrades in the backend framework and infrastructure. Which customers take time to understand and get used to it. As a result, the lagged effect is experienced in many e-banking channels' relationship with banking sector performance (Bhatnagr & Rajesh, 2024; Sivathanu, 2019). Furthermore, e-banking reduces operational costs through physical branches and staff requirements. However, it initially increases the cost associated with technical staff and training programs. Due to this, the benefits associated with e-banking channels in the current period have not materialized. However, with time, the effect is visible with the increase in customer base (Häärä, 2021; Pousttchi & Dehnert, 2018), which supports the notion of persistence confirmed in the table initially.

Table 5 shows no autocorrelation problem in the model as the Durbin-Watson value is within limits, which Breusch-Godfrey LM further confirms. Along with that, Breusch-Pagan-Godfrey confirms there is no heteroskedasticity. Meanwhile, figure 1 confirms that residuals are normal (Chukwu & Molokwu, 2022). Moreover, Figures 2 and 3 CUSUM and CUSUM of squares confirm that the model has no structural break and that the estimated model is stable (Gwachha, 2023).

Table: 5 ARDL Model Estimation

Table Selected Model: ARDL(3, 2, 0, 0, 4, 1, 2, 2)		
Variable	**Coefficient**	**Std. Error**
ROA(-1)	1.425907***	0.133820
ROA(-2)	0.304435	0.239727
ROA(-3)	0.337613**	0.141158
EC	-0.000696*	0.000383
EC(-1)	-0.000389	0.000333
EC(-2)	-0.000443	0.000363
IB	0.000235	0.000585
IVR	-0.000664	0.000584
MB	-9.35E-05	5.57E-05
MB(-1)	-0.000275***	5.56E-05
MB(-2)	-0.000117**	5.80E-05
MB(-3)	-7.95E-05	5.22E-05
MB(-4)	-0.000108**	4.97E-05
POS	7.40E-05	0.000690
POS(-1)	-0.000734	0.000638
RTOB	0.000823	0.001112
RTOB(-1)	-0.001712	0.001198
RTOB(-2)	-0.001785**	0.000809
ATM	-0.000912	0.001739
ATM(-1)	0.005634***	0.001871
ATM(-2)	0.003960**	0.001720
INF	-9.65E-06	1.39E-05
Eco_g	-6.01E-06	3.67E-05
C	0.002381***	0.000551
R-squared	**0.683308**	
Adjusted R-squared	**0.669562**	
Durbin-Watson stat	**2.033337**	
F-statistic	**68.26746*** **	
Breusch-Pagan-Godfrey	**1.519350**	
Breusch-Godfrey Serial Correlation LM	**0.823917**	

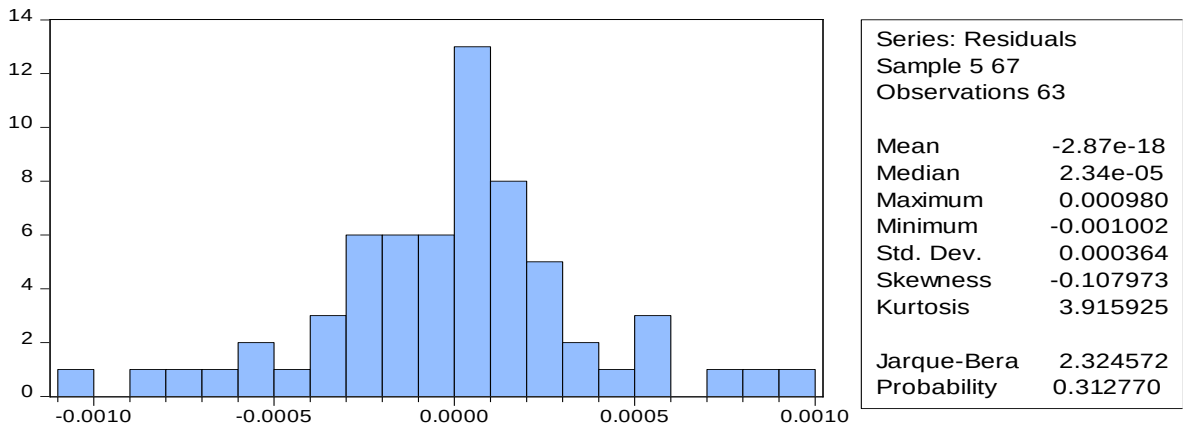

Figure 1: Normality Test

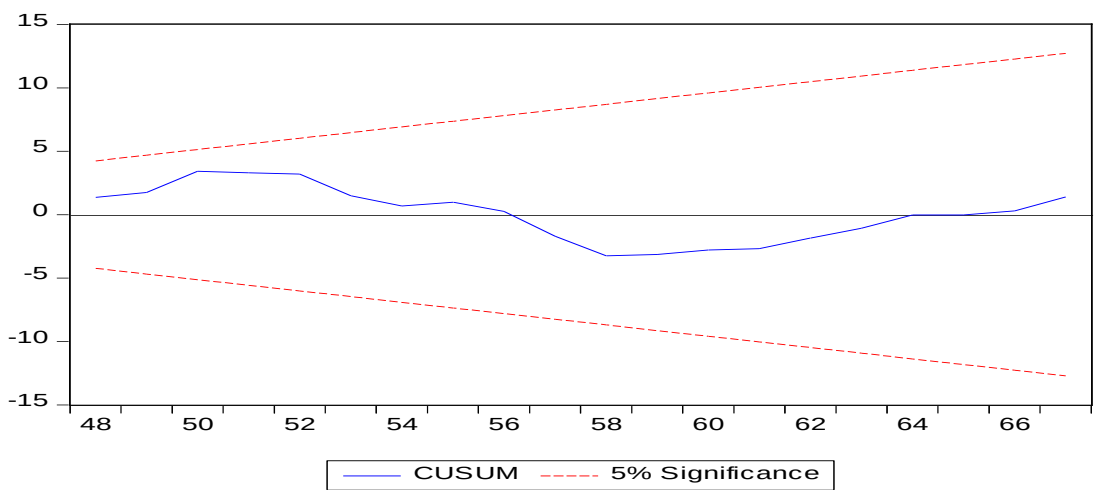

Figure 2: CUSUM Test

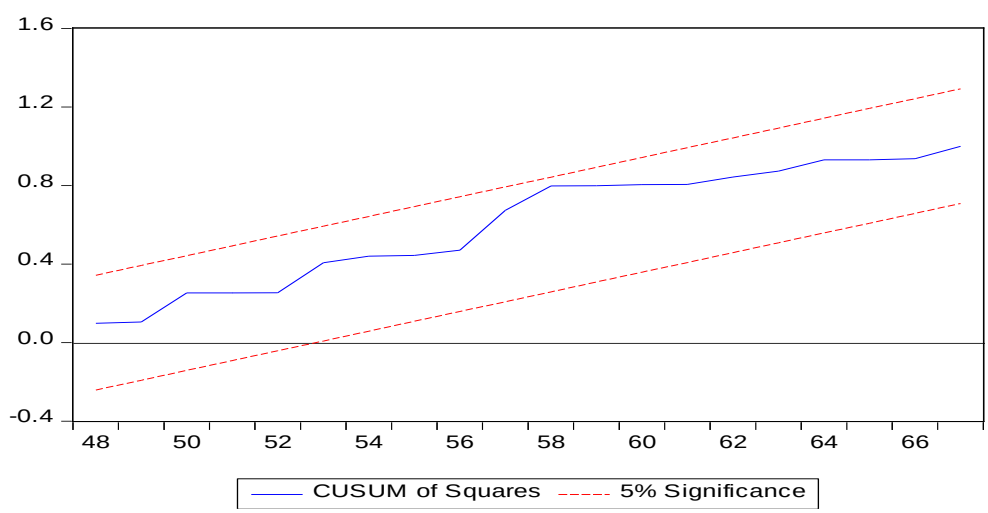

Figure 3: CUSUM of Square

Table 6 confirms that the value of the Bound test is greater than the upper critical values, confirming that a long-term association exists between banking sector performance and e-banking channels. Table 7 confirms that in the long run, the banking sector's performance is affected by ATM, EC and MB. Results confirmed that in case of any deviations in bank performance in the long run scenario. The pace of adjustment is 21.6% per quarter, which is quite a moderate speed. Banks are quite efficient in aligning their overall operations to be on track as soon as possible (Bakkar et al., 2023).

Table 6: Bound Test

Test Statistic	Value	Significance	Lower Value	Upper Value
F-statistic	5.302867	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

With the increase in the use of ATMs, overall banking sector performance improves in the long run because well-managed ATM services act as a source for income generation from other sources, improving overall bank performance (Ashraf et al., 2023). This also acts as an income diversification activity performed by the bank, which gives the bank a competitive advantage over others (Muditomo et al., 2024; Sharma, 2023). Similarly, a negative significant long-term relationship was established between MB and the performance of banks. Due to the increasing cost associated with upgrading MB services and security and the increasing numbers of online frauds propagated on print and social media, customers are reluctant to engage in MB, negatively impacting bank performance (Lv et al., 2022). Moreover, despite huge marketing efforts to engage the customer in EC, a very small growth is observed compared to other available e-banking channels. The basic reason behind this reluctance in customer acceptance is that EC is a new induction in e-banking channels, especially in the case of Pakistan, from the rest of the available options (Angeloni & Rossi, 2021; Jiang et al., 2023). Customer behavior in Pakistan accepts the new features quite slowly, mainly because of their low-risk tolerance level and financial literacy (Calcagno & Monticone, 2015; Stolper & Walter, 2017). It leads to high input cost and low revenue generation, which leads to a negative significant long-term relationship between EC and bank performance (Okoye et al., 2021; Wirdiyanti et al., 2023).

Table 7: ARDL Long Run Estimations

Variable	Coefficient	Std. Error
ATM	0.040164**	0.018549
EC	-0.007066***	0.002521
IB	0.001089	0.002700
IVR	-0.003072	0.002865
MB	-0.003113***	0.000663
POS	-0.003052	0.004737
RTOB	-0.012373	0.009796
C	0.011035***	0.001163
Error Correction Adjustment		
CointEq(-1)*	-0.216142***	0.031639

Significance level: *** for 1%, ** for 5%, * for 10%

CONCLUSION AND POLICY IMPLICATION

Conclusion

The study empirically investigated the relationship between e-banking channels and bank performance while the impact of macroeconomic variables like inflation and GDP is controlled. This is an industry-level study in which quarterly data is collected from 2006 to 2022. The ARDL Bound test is used to extract the results confirming that persistence in performance is a dominant factor in shaping current bank performance. Not all e-banking channels are affecting bank performance. Due to familiarity with the ATM, its ease of use, and its ability to be used on various platforms across various demographic locations, ATMs increase bank performance. However, MB and EC, due to high infrastructure costs, the newness of the facility, and high fraud by the customers' perception and reported cases, lead to low adoption rates, negatively affecting bank performance. Additionally, IB, POS, and IVR have insignificant relationships, highlighting the dire need to start a well-structured customer education program like a step-by-step guide to mobile banking in native languages and digital literacy workshops to enhance adoption rates and improve performance (Abbasi & Hamid, 2024).

Implications

The study confirms how much customer awareness is important in adopting e-banking channels. The low adoption of MB and EC reduces the overall performance of the banking industry despite huge investments made by commercial and state banks. Security concerns and high associated costs like infrastructure development and maintenance require banks to focus on customer trust and accessibility.

Theoretical Implications

Results of the study confirm the perfect alignment with the technology acceptance model and confirm that those e-banking channels considered useful and perceived as easy to use, like ATMs, increase the bank performance because customers are familiar with the use and experience their usefulness. In comparison, MB and EC are quite new, with high-security concerns and procedural complexities that limit the acceptance by the customer. Hence, banks must address these issues, improve their adoption rate, and improve overall performance.

Practical Implications

For fruitful results, banks and policymakers must use targeted intervention. The banks need to develop means to improve customer education and financial literacy to motivate them to be involved in e-banking processes like MB and EC. For instance, banks should use the services of expert fintech firms to design and develop secure, user-friendly e-banking services at the lowest possible charges with a dedicated 24/7 customer support portal. This will increase customer confidence in using these channels despite the associated risks (Kazmi & Fatima, 2024).

Limitations and future research directions

This study is focused on industry-level analysis and doesn't account for individual banks and customers. Future research should focus on these areas to help policymakers and banks devise a more targeted action plan for fruitful results.

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